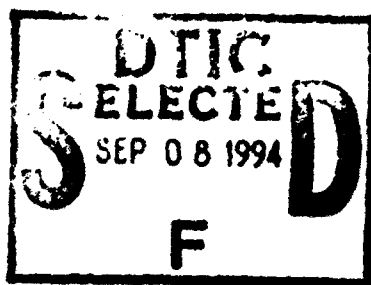




# SOLID STATE ELECTRONICS LABORATORY

DEPARTMENT OF ELECTRICAL ENGINEERING  
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TELEPHONE: FAX: 415-723-4050

AD-A284 181



August 29, 1994

Defense Technical Information Center  
Building 5, Cameron Station  
Alexandria, Virginia 22304-6145

Dear Sir:

Please find enclosed one copy of the monthly progress report for the month of July 1994 for contract N00014-92-J-1996 entitled "Low Voltage Electron Beam Lithography".

Sincerely,

R. Fabian Pease  
Professor of Electrical  
Engineering

sc

Encls.

cc: Ruth Kaempf  
Patti McCabe

280 94-28912

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## LOW VOLTAGE ELECTRON BEAM LITHOGRAPHY

R.Browning and R.F.W.Pease  
Center for Integrated Systems,  
Stanford University  
Stanford, Ca 94305.

The contract has three parts covering aspects of high precision electron beam lithography. (1) Comprehensive computer modeling of the electron beam tool. (2) Experimental determination of the properties of sources, columns, and targets, and (3) The use of silicon single crystals as straightness and orthogonality standards using orientation dependent etching techniques.

Tasks 1-4. Comprehensive modeling of the electron beam tool.

In the previous reporting periods progress in the calculation of an empirical elastic scattering cross section for electron/atom scattering was reported.

Preparation of a publication using the cross section and explaining some features of experiment/theory conflicts has been completed in this month and was mailed out on the 15th July. This paper is to be published in the Scanning. The title is:

"Low Energy Electron/Atom Elastic Scattering Cross Sections  
from 0.1-30 keV"

R.Browning T.Z.Li, B.Chui, Jun Ye, R.F.W.Pease,  
C Czyzewski, and D.C.Joy.

During the preparation of the paper it became apparent that many results were sensitive to the near surface details of the target. The presence of only 2nm of contamination was found to be sufficient to reduce the backscattered current by 4% at 1keV. Also 10nm roughness is sufficient to give large effects, up to 15% enhancement at low energies. In order to investigate this effect on metrology and the low energy target interaction a new computer program is being written to simulate these effects. These are extremely lengthy calculations and the original program is being converted from Basic to C and will eventually be put onto the multiprocessor Dash computer in parallel form.

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